AMENDMENTS TO THE CLAIMS

Please cancel claims 1-5 and 7-12:

Claim 13 (New): A turbo decoder having a state metric, comprising:

branch metric calculation means for calculating a branch metric by receiving symbols through an input buffer;

state metric calculation means for calculating a reverse state metric by using the calculated branch metric at said branch metric calculating means, storing the reverse state metric in a memory, calculating a forward state metric; and

log likelihood ratio calculation means for calculating a log likelihood ratio by receiving the forward state metric from said state metric calculation means and reading the reverse state metric saved at a memory in said state metric calculation means,

wherein the log likelihood ratio L_k is calculated by using an equation $\overset{2^v-1}{\underset{m-0}{E}}(A_k^{1,m}+B_k^{s(m)})-\overset{2^v-1}{\underset{m-0}{E}}(A_k^{0,m}+B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; $s(m)$ is a function a number complemented a Most Significant Bit(MSB)of binary number of m; $\overset{1}{\underset{j-0}{E}}$ is a function defined as $\overset{1}{\underset{j=0}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0}+e^{A_k^1})$; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^m is a k^{th} reverse state metric with state m.

Claim 14 (New): The turbo decoder in recited as claim 13, wherein said state metric calculation means includes:

reverse state metric calculation means for calculating a reverse state metric in case an input i is 0 according to states of the branch metric; and

forward state metric calculation means for calculating a forward state metric in case an input i is 0 or in case the input i is 1 according to states of the branch metric.

Claim 15 (New): A calculation method implemented to a turbo decoder, comprising steps of:

a) calculating a branch metric by receiving symbols;

b) calculating a reverse state metric in case an input i is 0 by using the calculated branch metric and saving the calculated reverse state metric in a memory;

c) calculating a forward state metric in case an input i is 0 or in case the input i is 1 by using the calculated branch metric;

d) calculating a log likelihood ratio by using the forward state metric and the reverse state metric; and

e) storing the log likelihood ratio,

wherein the log likelihood ratio L_k is calculated by using an equation

$\underset{m-0}{\overset{2^{v}-1}{E}}(A_k^{1,m}+B_k^{s(m)})$ - $\underset{m-0}{\overset{2^{v}-1}{E}}(A_k^{0,m}+B_k^{m})$ wherein *m* is a state of a trellis diagram; *s(m)* is a function provides a number complemented a Most Significant Bit (MSB) of binary number of m; $\underset{j-0}{\overset{1}{E}}$ is a function defined as $\underset{j=0}{\overset{1}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0}+e^{A_k^1})$;*j* is a *(k-1)*th input for a reverse state metric; *k* is a stage; $A_k^{1,m}$ is a k^{th} forward state metric with state *m* and input *1*; $B_k^{s(m)}$ is a k^{th} reverse state metric with state *s(m)*; $A_k^{0,m}$ is a k^{th} forward state metric with state *m* and input *0* and B_k^m is a k^{th} reverse state metric with state *m*.

Claim 16 (New): The calculation method as recited in claim 15, wherein the reverse state metric B_k^m, which is k^{th} reverse state metric with state *m*, is calculated by using an equation $\underset{j=0}{\overset{1}{E}}(B_{k+1}^{F(j,m)}+D_{k+1}^{j,f(m)})$, wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *f(m)* is the state of *(k+1)*th stage related to *the state m of k*th stage; *F(j,m)* is a function defined as *F(j,m)=f(m)* for *j=0* and *F(j,m) = s(f(m))* for *j=1*; *s(m)* is a function provides a number complemented for a Most Significant Bit (MSB) of binary number of m; $\underset{j=0}{\overset{1}{E}}$ is a function defined as

$\underset{j=0}{\overset{1}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0} + e^{A_k^1})$; $B_{k+1}^{F(j,m)}$ is a *(k+1)*th reverse state metric with state *F(j,m)* and $D_{k+1}^{j,f(m)}$ is *(k+1)th* branch metric with state *m* and *(k+1)*th input.

Claim 17 (New): The calculation method as recited in claim 15, wherein the forward state metric A_k^m, which is k^{th} forward state metric with state *m*, is calculated by using an equation $\underset{j=0}{\overset{1}{E}}(D_k^{j,b(j,m)} + A_{k-1}^{b(j,m)})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *b(j,m)* is the reverse state of the *(k-1)*th stage; *j* is a *(k+1)*th input for a reverse state metric; $\underset{j=0}{\overset{1}{E}}$ is a function defined as $\underset{j=0}{\overset{1}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0} + e^{A_k^1})$; $A_{k-1}^{b(j,m)}$ is a *(k-1)*th forward state metric with state *b(j,m)*and $D_k^{j,b(j,m)}$ is k^{th} branch metric with state *b(j,m)*.

Claim 18 (New): The calculation method as recited in claim 15, wherein the reverse state metric B_k^m, which is k^{th} reverse state metric with state *m*, is calculated by using an equation $\underset{j=0}{\overset{1}{2}}(B_{k+1}^{F(j,m)} + D_{k+1}^{j,f(m)})$, wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *f(m)* is a state of *(k+1)*th stage related to k^{th} state with state *m*; *F(j,m)* is a function defined as *F(j,m)=f(m)* for *j=0* and *F(j,m) = s(f(m))* for *j=1*; *s(m)* is a function provides a number complemented for a Most Significant Bit (MSB) of binary number of m; $\underset{j=0}{\overset{1}{2}}$ is a function defined as $\underset{j=0}{\overset{1}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + e^{A_k^1})$; $B_{k+1}^{F(j,m)}$ is a *(k+1)*th reverse state metric with state *F(j,m)* and $D_{k+1}^{j,f(m)}$ is *(k+1)th* branch metric with state *m* and *(k+1)*th input.

Claim 19 (New): The calculation method as recited in claim 15, wherein the forward state metric A_k^m, which is k^{th} forward state metric with state *m*, is calculated by

using an equation $\underset{j=0}{\overset{1}{2}} (D_k^{j,b(j,m)} + A_{k-1}^{b(j,m)})$ wherein m is a state of a trellis diagram; k is a stage; $b(j,m)$ is a $(k\text{-}1)^{th}$ reverse state; j is a $(k+1)^{th}$ input for a reverse state metric; $\underset{j=0}{\overset{1}{2}}$ is a function defined as $\underset{j=0}{\overset{1}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1})$; $A_{k-1}^{b(j,m)}$ is a $(k\text{-}1)^{th}$ forward state metric with state $b(j,m)$and $D_k^{j,b(j,m)}$ is k^{th} branch metric with state $b(j,m)$.

Claim 20 (New): The calculation method as recited in claim 15, wherein the log likelihood ratio L_k is calculated by using an equation $\underset{m=0}{\overset{2^v-1}{2}} (A_k^{1,m} + B_k^{s(m)})$ - $\underset{m=0}{\overset{2^v-1}{2}}$ $(A_k^{0,m} + B_k^m)$ wherein m is a state of a trellis diagram; k is a stage; $s(m)$ is a function provides a number complemented for a Most Significant Bit (MSB) of binary number of m; $\underset{j=0}{\overset{1}{2}}$ is a function defined as $\underset{j=0}{\overset{1}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^m is a k^{th} reverse state metric with state m.

Claim 21 (New): A computer-readable recording medium storing instructions for executing a calculation method implemented to a turbo decoder, comprising functions of:

calculating a branch metric by receiving symbols;

calculating a reverse state metric in case an input i is 0 by using the calculated branch metric and saving the calculated reverse state metric in a memory;

calculating a forward state metric in case an input i is 0 or in case the input i is 1 by using the calculated branch metric;

calculating a log likelihood ratio by using the forward state metric and the reverse state metric; and

storing the log likelihood ratio,

wherein the log likelihood ratio L_k is calculated by using an equation $\underset{m=0}{\overset{2^\nu-1}{E}}(A_k^{1,m}+B_k^{s(m)})$ - $\underset{m=0}{\overset{2^\nu-1}{E}}(A_k^{0,m}+B_k^{m})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *s(m)* is a function provides binary number of m with a most significant bit complemented; $\underset{j=0}{\overset{1}{E}}$ is a function defined as $\underset{j=0}{\overset{1}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0}+e^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state *m* and input *1*; $B_k^{s(m)}$ is a k^{th} reverse state metric with state *s(m)*; $A_k^{0,m}$ is a k^{th} forward state metric with state *m* and input *0* and B_k^{m} is a k^{th} reverse state metric with state *m*.

Claim 22 (New): The computer-readable recording medium as recited in claim 21, wherein the log likelihood ratio L_k is calculated by using an equation $\underset{m=0}{\overset{2^\nu-1}{2}}(A_k^{1,m}+B_k^{s(m)})$ - $\underset{m=0}{\overset{2^\nu-1}{2}}(A_k^{0,m}+B_k^{m})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *s(m)* is a function provides binary number of m with a most significant bit complemented; $\underset{j=0}{\overset{1}{2}}$ is a function defined as $\underset{j=0}{\overset{1}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0}+2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state *m* and input *1*; $B_k^{s(m)}$ is a k^{th} reverse state metric with state *s(m)*; $A_k^{0,m}$ is a k^{th} forward state metric with state *m* and input *0* and B_k^{m} is a k^{th} reverse state metric with state *m*.

Claim 23 (New): The turbo decoder having a state metric as recited in claim 13, wherein the log likelihood ratio L_k is calculated by using an equation $\underset{m=0}{\overset{2^\nu-1}{2}}(A_k^{1,m}+B_k^{s(m)})$ - $\underset{m=0}{\overset{2^\nu-1}{2}}(A_k^{0,m}+B_k^{m})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *s(m)* is a function provides binary number of m with a most

significant bit complemented; $\overset{1}{\underset{j=0}{2}}$ is a function defined as $\overset{1}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state *m* and input *1;* $B_k^{s(m)}$ is a k^{th} reverse state metric with state *s(m);* $A_k^{0,m}$ is a k^{th} forward state metric with state *m* and input *0* and B_k^m is a k^{th} reverse state metric with state *m.*